

CPU , RAM & SERVER SWAP UTILIZATION

AIM : Develop the script for monitoring Server CPU Utilization, RAM Utilization, Swap Utilization and Threshold 90 %.

APPLICATIONS :

- LINUX (UBUNTU)
- PYCHARM

HOW TO GET CURRENT CPU UTILIZATION IN PYTHON :

CPU USAGE :

There are Two methods for finding the CPU & RAM usage in python.

- Method 1 -Using psutil
- Method 2 -Using OS module

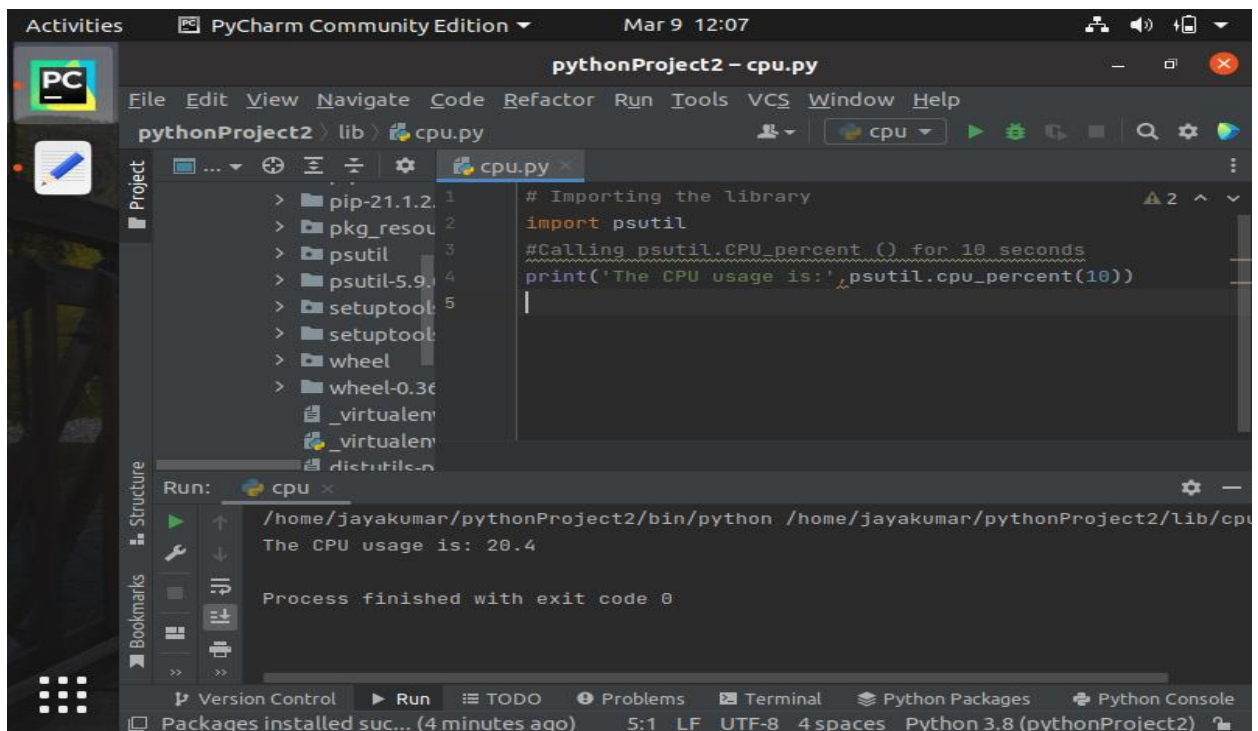
In this project I am use psutil method

Method 1: Using psutil

The function `psutil.cpu_percent()` provides the current system wide CPU utilization in the percentage.

SYNTAX :

`Cpu_percent(time_interval)`



The screenshot shows the PyCharm IDE interface. The main editor window displays a file named `cpu.py` with the following Python code:

```
1 # Importing the library
2 import psutil
3
4 #Calling psutil.CPU_percent() for 10 seconds
5 print('The CPU usage is:', psutil.cpu_percent(10))
```

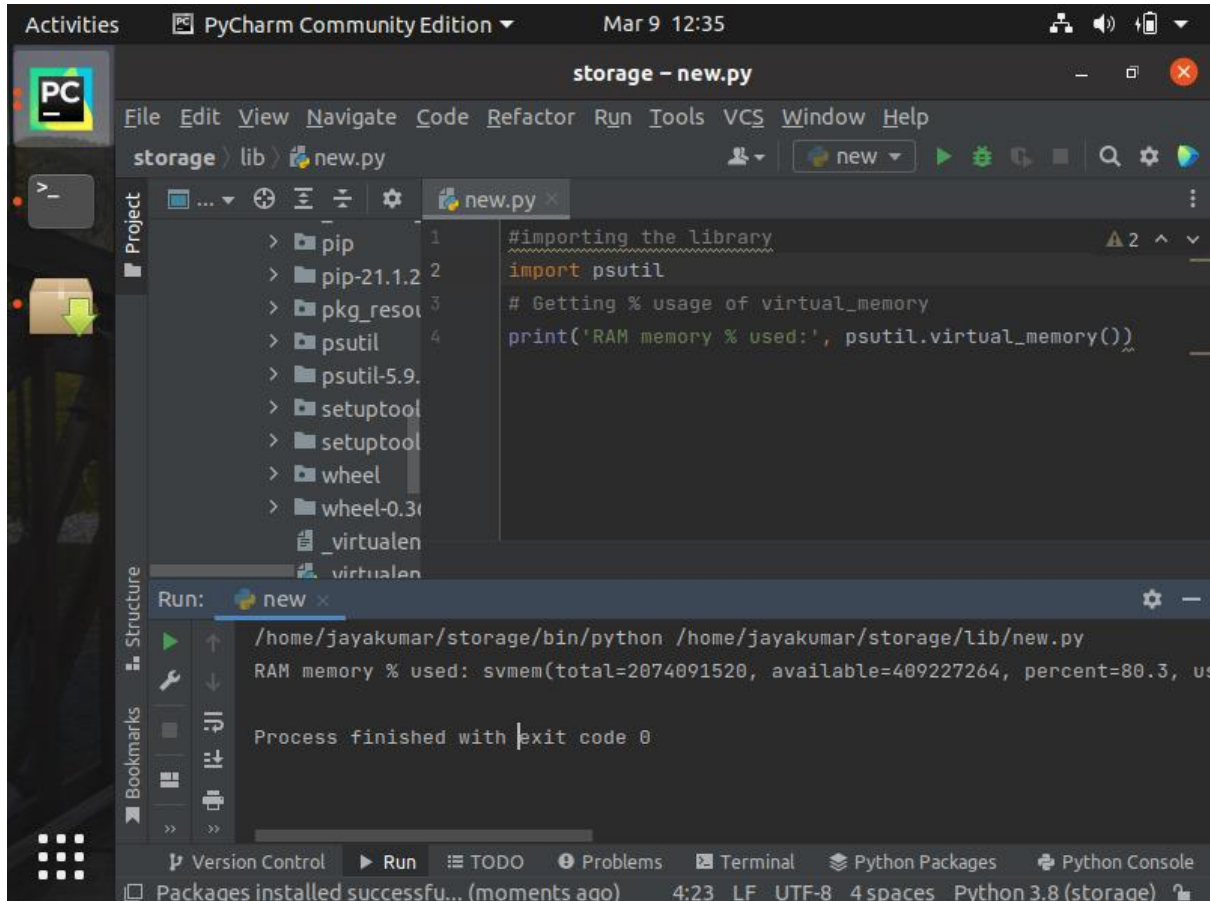
The left sidebar shows the project structure with a folder named `pythonProject2` containing a `lib` folder and a `cpu.py` file. The bottom panel shows the output of the script, indicating that the CPU usage is 20.4% and the process finished with exit code 0.

OUTPUT :

The CPU usage is :20.4

RAM USAGE :

The function **psutil.virtual_memory()** returns a named tuple about system memory usage. The *third field* in tuple represents the percentage use of the memory(RAM). It is calculated by **(total – available)/total * 100** .

A screenshot of the PyCharm Community Edition IDE. The top toolbar shows the 'Run' button (a green play icon). The main editor window displays a file named 'new.py' with the following code:

```
1 #importing the library
2 import psutil
3
4 # Getting % usage of virtual_memory
5 print('RAM memory % used:', psutil.virtual_memory())
```

The left sidebar shows the 'Project' view with a tree of files and folders, including 'pip', 'pip-21.1.2', 'pkg_resol', 'psutil', 'psutil-5.9', 'setuptools', 'setuptools', 'wheel', 'wheel-0.3', and '_virtualen'. The bottom panel shows the 'Run' output, which contains the command executed and the output of the script:

```
/home/jayakumar/storage/bin/python /home/jayakumar/storage/lib/new.py
RAM memory % used: svmem(total=2074091520, available=409227264, percent=80.3, us
Process finished with |exit code 0
```

OUTPUT :

RAM memory % used: svmem(total=2074091520, available=409227264, percent=80.3, used=1490018304, free=96092160, active=288096256, inactive=1509113856, buffers=12025856, cached=475955200, shared=11685888, slab=114032640)

SERVER SWAP SPACE :

If you are a Linux user, you may notice that there is a swap partition on your computer. The function of this partition is similar to virtual memory (paging file) on Windows.

When the actual memory is not enough, the operating system will take out part of the temporarily unused data from the memory and place it into the swap partition, thereby freeing up enough memory space for the currently running program.

In Linux, users can use command "`~$ free`" or "`~$ free -h`" to display swap utilization. In Windows, the system will not display the swap usage or virtual memory usage. In most case, users may see the swap usage on third-party software like

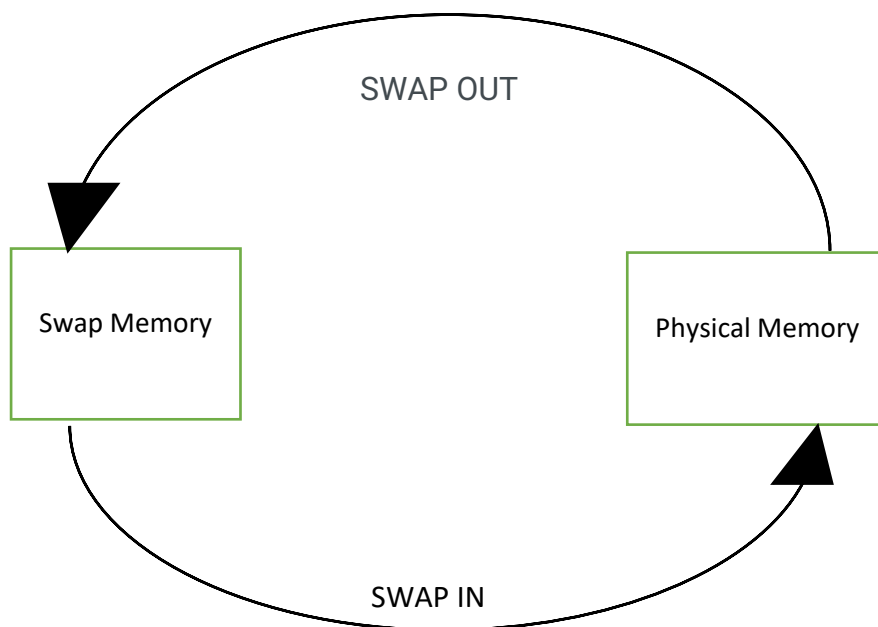


Fig : SWAP PROESS

What is an Acceptable Swap Usage Percentage ?

Actually, Swap usage percentage is not so much important. Instead, you should check the Swap space making sure it is not too big or too small

According to Microsoft, the Windows Swap space (virtual memory) should be 1.5 times or twice the physical memory. As for Linux systems, you can refer to RedHat's saying. There commended swap space is as follows:

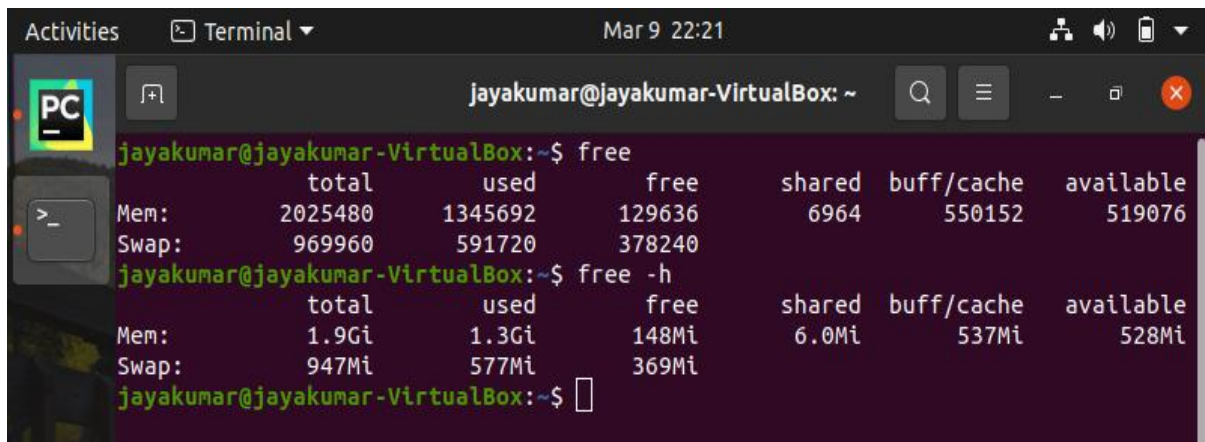
Amount of RAM in the system	Recommended swap space	Recommended swap space if allowing for hibernation
<=2GB	2 times the amount of RAM	3 times the amount of RAM
2GB – 8GB	Equal to the amount of RAM	2 times the amount of RAM
8GB – 64GB	At least 4 GB	1.5 times the amount of RAM
> =64GB		Hibernation not recommended

HOW TO CHECK SWAP SPACE IN LINUX :

- 5 Commands to check swap space in Linux
 - The Linux free command (free, free-h, free-)
 - The swapon command (swapon-s)
 - The Top command
 - The vmstat command
 - The /proc/swaps file

THE LINUX FREE COMMAND :

This command is used to check memory and swap utilization on your system in a few lines. Without the use of any switch, the displayed output is printed in Kilobytes.



```

jayakumar@jayakumar-VirtualBox: ~
jayakumar@jayakumar-VirtualBox:~$ free
              total        used        free      shared  buff/cache   available
Mem:           2025480    1345692    129636      6964     550152     519076
Swap:           969960     591720     378240
jayakumar@jayakumar-VirtualBox:~$ free -h
              total        used        free      shared  buff/cache   available
Mem:           1.9Gi       1.3Gi       148Mi       6.0Mi       537Mi       528Mi
Swap:           947Mi       577Mi       369Mi

```

THE SWAPON COMMAND :

Swapon -s

You can use the swapon command to check swap on a particular partition, logical volume or a file. Here we will use it with the -s (summary) switch in order to get swap details (in kilobytes).

```
jayakumar@jayakumar-VirtualBox: ~  
jayakumar@jayakumar-VirtualBox:~$ swapon  
NAME      TYPE      SIZE      USED      PRIO  
/swapfile file 947.2M 449.1M -2  
jayakumar@jayakumar-VirtualBox:~$ swapon -s  
Filename      Type      Size      Used  
Priority  
/swapfile      file      969960    4598  
80 -2
```

THE TOP COMMAND :

Command : top

The header section of the top command output shows space information, in kilobytes. Other commands that give this information include htop, glances, and itop, etc.

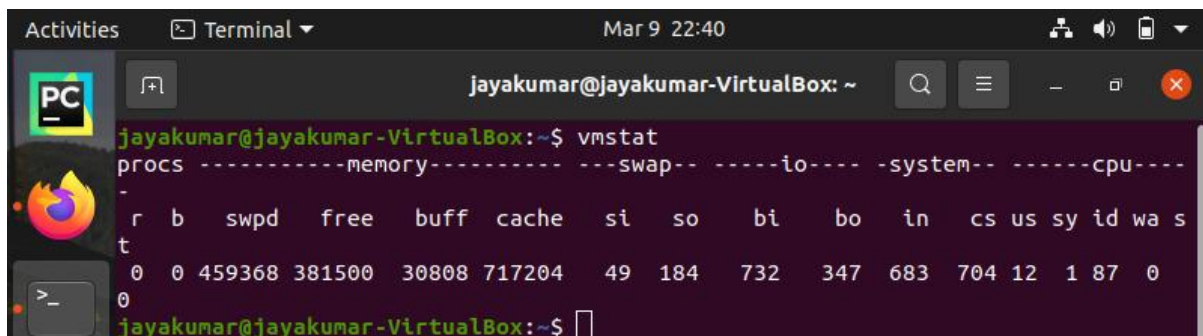
```
Activities Terminal Mar 9 23:19  
jayakumar@jayakumar-VirtualBox: ~  
jayakumar@jayakumar-VirtualBox:~$ top  
top - 23:19:28 up 1:31, 1 user, load average: 0.93, 0.56, 0.31  
Tasks: 193 total, 1 running, 192 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 7.9 us, 0.7 sy, 0.0 ni, 91.0 id, 0.3 wa, 0.0 hi, 0.0 si, 0.0 st  
MiB Mem : 1978.0 total, 363.6 free, 902.3 used, 712.0 buff/cache  
MiB Swap: 947.2 total, 507.1 free, 440.1 used. 906.0 avail Mem  


| PID  | USER     | PR  | NI  | VIRT    | RES    | SHR    | S | %CPU | %MEM | TIME+   | COMMAND |
|------|----------|-----|-----|---------|--------|--------|---|------|------|---------|---------|
| 4862 | jayakum+ | 20  | 0   | 8940120 | 274504 | 106516 | S | 5.6  | 13.6 | 0:14.99 | Isolat+ |
| 4711 | jayakum+ | 20  | 0   | 3485436 | 320144 | 154884 | S | 2.0  | 15.8 | 0:16.86 | firefox |
| 24   | root     | 20  | 0   | 0       | 0      | 0      | S | 0.3  | 0.0  | 0:00.65 | kcompa+ |
| 1154 | jayakum+ | 20  | 0   | 2269724 | 10520  | 7936   | S | 0.3  | 0.5  | 0:00.95 | pulsea+ |
| 1382 | jayakum+ | 20  | 0   | 3452024 | 198056 | 59256  | S | 0.3  | 9.8  | 1:42.37 | gnome-+ |
| 4678 | root     | 20  | 0   | 0       | 0      | 0      | I | 0.3  | 0.0  | 0:00.16 | kworke+ |
| 4782 | jayakum+ | 20  | 0   | 2419048 | 116208 | 89000  | S | 0.3  | 5.7  | 0:01.49 | Privil+ |
| 5031 | jayakum+ | 20  | 0   | 11852   | 3680   | 3172   | R | 0.3  | 0.2  | 0:00.03 | top     |
| 1    | root     | 20  | 0   | 167540  | 6540   | 4228   | S | 0.0  | 0.3  | 0:01.05 | systemd |
| 2    | root     | 20  | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.00 | kthrea+ |
| 3    | root     | 0   | -20 | 0       | 0      | 0      | I | 0.0  | 0.0  | 0:00.00 | rcu_gp  |
| 4    | root     | 0   | -20 | 0       | 0      | 0      | I | 0.0  | 0.0  | 0:00.00 | rcu_pa+ |
| 6    | root     | 0   | -20 | 0       | 0      | 0      | I | 0.0  | 0.0  | 0:00.00 | kworke+ |
| 9    | root     | 0   | -20 | 0       | 0      | 0      | I | 0.0  | 0.0  | 0:00.00 | mm_per+ |
| 10   | root     | 20  | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.00 | rcu_ta+ |
| 11   | root     | 20  | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.00 | rcu_ta+ |
| 12   | root     | 20  | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.37 | ksofti+ |
| 13   | root     | 20  | 0   | 0       | 0      | 0      | I | 0.0  | 0.0  | 0:00.91 | rcu_sc+ |
| 14   | root     | rt  | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.05 | migrat+ |
| 15   | root     | -51 | 0   | 0       | 0      | 0      | S | 0.0  | 0.0  | 0:00.00 | idle_i+ |


```

THE VMSTAT COMMAND :

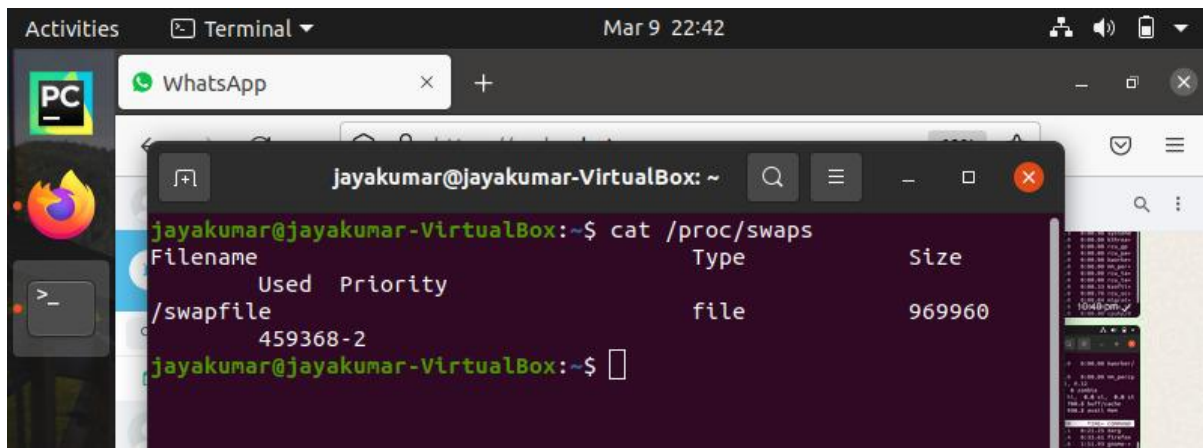
Through the vmstat command, you can view the swap in and swap out information. However, you can see the total values of the swap as seen in previously mentioned commands.



```
jayakumar@jayakumar-VirtualBox: ~  
jayakumar@jayakumar-VirtualBox:~$ vmstat  
procs -----memory----- --swap-- -----io----- -system-- -----cpu-----  
- r b swpd free buff cache si so bi bo in cs us sy id wa s  
t  
0 0 459368 381500 30808 717204 49 184 732 347 683 704 12 1 87 0  
0  
jayakumar@jayakumar-VirtualBox:~$
```

The /proc/swaps file

You can also view the swap size information through the swap configuration file /proc/swaps. It also displays device-wise swap information so that you can see device name (partition, logical, volume or file), its type and how much swap it contributing to the system.



```
jayakumar@jayakumar-VirtualBox: ~  
jayakumar@jayakumar-VirtualBox:~$ cat /proc/swaps  
Filename                Type      Size  
Used Priority  
/swapfile                file      969960  
459368-2
```

REFERENCE :

- <https://youtu.be/0mgefj9ibRE>
- https://youtu.be/Qt49Hzh_TDc
- <https://youtu.be/Zdo-ELkfkK0>
- <https://vitux.com/how-to-check-swap-space-in-linux/>
- <https://www.javatpoint.com/cpu-utilization-in-linux>